

Appln. No. 09/856,335
Amdt. dated April 19, 2005
Reply to Office action of August 23, 2004

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (previously presented) A process for producing a corrosion- and wear-resistant layer on a substrate by spraying on an iron oxide-based material, characterised in that the iron oxide-based material which has at least 20% by weight of magnetite (Fe_3O_4 and/or Fe_2O_4) is applied by on-line controlled thermal spraying and in that the layer of the material is monitored by an on-line monitoring and control system, whereby properties of the material to be deposited are measured within the thermal spray.
2. (withdrawn) A process as set forth in claim 1 characterised by on-line monitoring and control by means of an ITG-camera (18) directed on to the spray jet (10), an LDA-detector (20) with LDA-laser (22) and an HSP-head (24) (Figure 1).
3. (withdrawn) A process as set forth in claim 1 characterised by on-line monitoring and control by measurement of the particle speed in the spray flame.
4. (withdrawn) A process as set forth in claim 1 characterised by on-line monitoring and control by means of measurement of the particle speed in the spray flame by a laser Doppler anemometer by means of a beam (60) which is emitted from a laser device

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(62) and which is divided into two partial beams (60_a, 60_b) by an optical transmission system (64) (Figure 6).

5. (withdrawn) A process as set forth in claim 1 characterised by on-line monitoring and control by measurement of the particle speed in the spray flame by means of a high-speed pyrometer.

6. (withdrawn) A process as set forth in claim 1 characterised by on-line monitoring and control in which the particle temperature in the spray flame is measured by means of infra-red thermography (Figure 3).

7. (withdrawn) A process as set forth in claim 1 characterised by on-line monitoring and control in which the measured amount of gas is analysed.

8. (withdrawn) A process as set forth in claim 1 characterised by on-line monitoring and control in which a measured amount of plasma gas is analysed.

9. (withdrawn) A process as set forth in claim 1 characterised by on-line monitoring and control in which a measured current-voltage characteristic is evaluated.

10. (previously presented) A process as set forth in claim 1 characterised by on-line monitoring and control in which an amount of powder, which is fed to a plasma spray, is measured.

11. (canceled)

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12. (previously presented) A process for producing a corrosion- and wear-resistant layer as set forth in claim 1 characterised in that an on-line controlled, water-stabilised plasma spray process is used as the coating process.

13. (canceled)

14. (previously presented) A process as set forth in claim 1 characterised in that the material comprises pure magnetite.

15. (withdrawn) A process as set forth in claim 1 characterised in that the material comprises magnetite and at least one further metallic material.

16. (withdrawn) A process as set forth in claim 1 characterised in that the material comprises magnetite and at least one intermetallic compound.

17. (withdrawn) A process as set forth in claim 1 characterised by an addition of carbide or carbides or nitride or nitrides or silicide or silicides or boride or borides or oxide or oxides in the material.

18. (withdrawn) A process as set forth in claim 1 characterised by the addition of a mixture of metals, intermetallic compounds, carbides, nitrides, silicides, borides and/or oxides in the material.

19. (withdrawn) A process as set forth in claim 15 characterised by magnetite and an addition of up to 50% by weight of Cr, CrNi or a ferritic steel in the material.

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20. (withdrawn) A process as set forth in claim 1 characterised in that the material comprises magnetite and carbides of W, Cr, Mo, Nb, Ta, Ti or V.
21. (withdrawn) A process as set forth in claim 20 characterised in that the material comprises magnetite with an addition of up to 30% by weight of tungsten and/or chromium carbides.
22. (canceled)
23. (withdrawn) A process as set forth in claim 1 characterised by a mixture of magnetite and chromium oxide in the material with a proportion of the chromium oxide of between 1 and 40%.
24. (previously presented) A process as set forth in claim 1 characterised by a grain size of said material to be sprayed of between 0.05 and 150 μm .
25. (withdrawn) A process as set forth in claim 1 characterised by a filling wire in the form of wire spray material whose filling comprises magnetite and whose sheath comprises an alloy.
26. (withdrawn) A process as set forth in claim 1 characterised by a powder grain with good flow properties, which is produced from the powder material mixture by spray drying.

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27. (withdrawn) A process as set forth in claim 1 characterised by a powder grain which is resistant to separation of its mixture and which is produced from the powder material mixture by means of an agglomeration process.

28. (previously presented) A process for producing a corrosion- and wear-resistant layer on a substrate as set forth in claim 1 characterised in that said material to be sprayed has more than 30% by weight of magnetite (Fe_3O_4 and/or Fe_2O_3).

29. (withdrawn) A process as set forth in claim 21 characterised by magnetite and an addition of up to 40% by weight of Cr, CrNi or a ferritic steel in the material.

30. (withdrawn) A process as set forth in claim 20 characterised in that the material comprises magnetite with an addition of up to 20% by weight of tungsten and/or chromium carbides.

31. (withdrawn) A process as set forth in claim 1 characterised by a proportion of the chromium oxide of between 5 and 30% by weight.

32. (previously presented) A process as set forth in claim 1 characterised by a grain size of said material to be sprayed of between 0.1 and 120 μm .

33. (canceled)

34. (previously presented) The process of claim 1 wherein said spraying by on-line controlled thermal spraying comprising a

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mode of spraying selected from the group consisting of high-speed flame spraying, plasma spraying, high powered plasma spraying (HPPS), shroud plasma spraying (SPS), on-line controlled wire-flame spraying, and arc wire spraying.

35. (previously presented) The process of claim 1 wherein said spraying by on-line controlled thermal spraying comprises plasma spraying and said plasma spraying is performed in a mode selected from the group consisting of plasma spraying in air and plasma spraying in a vacuum.

36. (new) A process for producing a corrosion-and wear-resistant layer on a substrate comprising:

thermal spraying of an iron oxide-based material having at least 20% by weight of one or more of Fe_3O_4 and Fe_2O_4 ;

measuring properties of the material within the thermal spray by an on-line monitoring and control system; and

controlling the thermal spraying by the on-line monitoring and control system responsive to said measured properties.